



The Growing Edge

Improving Agriculture Through Science & Nature
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Understanding Plants and Soils

“Water, water, everywhere, but never a drop to drink” was a quote from the **Rime of the Ancient Mariner** by Samuel Taylor Coleridge. However, this could be a quote from anyone who went through this winter in Western Washington. We have had our share, plus some, of water on our open fields and perennial crops. In this article, I want to go over some of the problems in open fields and two perennial crops: grass seed and blueberries.

The problem in open fields—those with no growing crop—is compaction. With our soil types and clay content, compaction is the first of many concerns. Compacted soil not only creates an anaerobic, (without oxygen) situation in the soil, but as it does, it destroys the beneficial bacteria and fungi in the soil. These microorganisms need oxygen to live. Those that can live in anaerobic conditions go into a dormant phase. The main thing to remember is it takes a long time for them to wake up in the spring in a heavy, wet soil.

In perennial grass seed crops, heavy, wet soils can create big problems in the root systems. Even though the plant is dormant, roots will not stay dormant. They need to breathe in order to keep the plant in a state of rest waiting for spring. Now if you apply enough water to displace the oxygen at the root level, the plant dies.

Even if the roots do not die, there is so much damage to the root system that the plant will be very slow to green up in the spring. If the roots are stressed coming into spring, the soil pathogens will take over and your crop suffers.

In blueberries, another perennial crop, the impact of flooded or saturated soils does not show up right away. During times of anaerobic soil conditions, a compound called ACC builds up in the roots. The top part of the plants look fine until spring when the ACC is transported by the xylem up to the leaves which then begin to droop. The ACC increases ethylene buildup at the time when the plant should be growing.

As you can see, soil flooding and anaerobic soil conditions can cause a lot of havoc in an open field or on a crop. Understanding this may cause you to rethink how you leave a field in the fall.

A good example is shown in the two fields below. The field on the left is an example of an area of the field that is naturally heavy. It probably has a higher clay content and higher organic matter. The field on the right is holding water because a lot of heavy equipment has gone over it before the rain started. Basically it has “sealed over” and will not let water penetrate through.



Rudy's Corner



Here we are starting the 2009 growing season with about as many questions as we had at the end of 2008. Has the economy hit bottom? How long will it take to recover? How do the national and world economic problems impact my farm operations? Will there be stability in the fertilizer market? Will Seattle ever get another NBA Team? Maybe that last question doesn't mean as much as the others, but I'm sure some people are wondering.

The national and world economic problems will impact many aspects of your farm. Equipment dealers will monitor their expenses more closely and possibly have some employee layoffs. Recovery will take a long, long time

and it will be a very rough road. Those who are good farm managers with some financial assets will make it. Those who are not such good managers possibly will not. Remember though, being a good manager means making smart decisions based on good information. It doesn't mean going cheap; just because something or some program costs less, it may not be the best. That is where getting good, sound information comes in. The recession is going to impact agriculture just like any other segment of the national economy. Hold on tight and keep your head up.

The aspect of pricing stability in the fertilizer market all depends on your point of view. First of all, I don't think we will have any shortages of major components. For the last 19 years, I have never seen a farmer not get fertilizer due to a shortage. Pricing is a different animal. What happens nationally and globally will have an impact on us in the ag community. Some examples are as follows:

Nitrogen: After taking a nose dive from last year's lofty prices, nitrogen is now creeping slowly back up. This will be one to watch, but normally after the retail prices are set in the spring, they do not go up in the summer.

Phosphorus: Similar to nitrogen, phosphorus did come down some but nothing like nitrogen. I think this one will be stable for growing season 2009.

Potash: As I have said before, this one is the wild card of the group. It seems that the two countries that produce the lion's share, Canada and Russia, are also in need of as much money as they can get. They have closed mines, stopped refining, and laid off people to where they truly do control the market. Potassium will be higher than normal, probably until 2012.

Now let's look at reality. It is estimated that the world gains 212,000 people per day and somebody has to feed and clothe them for the next 70 years. China, India, and the US have the greatest population, but as history has shown us, it will be the United States who will be looked upon to feed those 212,000 new faces. An exciting challenge awaits production agriculture for the future. I believe organic production will decrease but conventional production must take some organic ideas to heart in order to produce what is needed. We must remember that the roots control the plants. If we do remember this and apply the products and technology to keep healthy roots, we will be able to feed and clothe all those new faces. We have both the knowledge and the land base to achieve this goal. What we cannot do is get in the way of our own progress; sometimes illogical environmental issues must be put on the back burner for the overall good. Farmers are the true "stewards" of the soil not some legislators in the "other" Washington.

Potato Production

I think it can be safely said that the potato crop of 2008 was not very spectacular. In fact, the crop had many more problems than opportunities. Everything from a cold, wet planting season to soils that just did not want to warm up. So we had a reduction in yield as well as a reduction in quality; if it were not for a decent, demanding market it could have been a disaster.

In light of the above, what could have been done differently? Certainly, we cannot change the weather or the impact the weather has on the crop. What we can do is change a few practices to help the crop recover from a weather incident and keep developing.

Planting: In-furrow applications of two quarts of HumaGro PopUp (1-19-0) will enhance root development and root growth. Why? Because along with the available phosphorus, it has a good calcium level. Calcium in the root area is critical for IAA transport from the top of the plant to the roots. If this doesn't happen, the roots will suffer and the plant stands still. There is no other in-furrow treatment that I know of that has this very dynamic combination.

Early Growth: If the temperature is under 72° the plant will not be making and transporting IAA to the roots. This is a critical time in your crop development. If you start to see the stolons develop and run to eight inches or longer, your crop is being dominated by gibberellic acid (GA) and not IAA. Early applications of HumaGro Vitol at one quart per acre and four ounces of Micro F will increase the IAA production of your crop. I would suggest a five- to seven-day interval with your fungicide program. If this is not followed, don't look for a bumper crop.

Tuber Set and Early Bulking: Once again, I must repeat, the flow of IAA is critical from the tops to the roots and developing tubers. IAA is the hormone that is needed for cell division. Potatoes can't grow if their cells can't divide. When you first see a flower bud, apply one quart of Vitol with eight ounces of Micro F. What we see here is a great combination of antioxidants and root stimulators. At the flower bud to flowering stage, the plant stops sending IAA to the roots and ethylene builds within the plant. These two products work through two different pathways to flush out the ethylene and keep the roots growing.

Bulking and Maturation: This is an area where we can do so much better if we understand what is needed to shut down the potato plant. Contrary to popular belief, in our soils with high clays and potassium levels, you cannot enhance maturation by adding more potassium! That's like trying to stop a runaway train by advancing the throttle. There is only one way for a potato tuber—and we are just worried about the tuber not the plant—to mature and develop a strong skin. The amount of Abscisic acid (ABA) must increase and the amount of G.A. must decrease. To do this with nutrients requires boron and molybdenum. This can be achieved by using Jackpot at two quarts per acre with one quart of Calcium two weeks before vine kill. It is affordable and your crop will be ready to mature earlier with better skin set and storability.



Above is an example of long, skinny shoots and thin roots.



This is a perfect early root system—massive roots and short stolons.

Vegetable Production

In vegetable production, either fresh or seed, the sooner the plants get out of the soil the better off they are. If you can use an in-furrow system, look at a low nitrogen, high phosphorus starter with a good biological mix with it. I would suggest one to two quarts of HumaGro's 1-19-0 with calcium and one ounce of PGPR Galaxy to get the plants started and root system developing.

When we use this program, we have very little, if any, plant loss due to *pythium* (dampening off). I believe the reason for this is that the auxin level is so high in the roots, that the *pythium* is not interested. Dampening off only occurs in the very young stages of plant growth. This is when the auxin in the roots is at its lowest level. The components of PGPR Galaxy produce the auxin for the roots as they associate onto the roots. This is why we do not see *pythium* in a Galaxy treated spinach or pea field.

The in-furrow treatment of the 1-19-0 is critical not just for the phosphorus. In order for the auxin IAA to be transported from the top of the plant to the roots, it must be replaced by soluble calcium coming from the roots up to the plant tops. It is important to not confuse soluble calcium with a recent lime application. The two are worlds apart.

The other aspect of this application will be the development of numerous seed points and good, high germination seed. The program has been proven for the last four years in all kinds of soil and weather conditions. The program works and those who use it will benefit greatly from it.

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Small Fruits

The small fruit market looks a lot like last year's market. Blueberries will probably still be soft but raspberries should still have some strength to them. I think the important aspect of production this year is for growers to look at their soil test results as critically as their spray program. Often time growers use an inexpensive soil test package that does not give soluble salts, CEC, or full range of micro nutrients. You may save \$20 to \$30 per sample but if you are only seeing half the picture, you are missing out on a lot. Pay the extra and get the data. It will make much more money for you than what you would have saved.

For those of you who had standing water in your fields think of what was happening in your roots during that time. In an anaerobic, water logged condition, the compound ACC will

build up in your roots. ACC is a precursor to ethylene. When the water is gone, the ethylene will ramp up in your roots and you will see it in the tops. As soon as you can, apply a drench containing one quart of Vitol with eight ounces of Micro F to flush out the ethylene. This will get the roots moving and keep the stress out of the plant.

Remember in raspberries look at one to two quarts of Breakout when new leaf growth is about three inches long. This will stimulate more laterals which will bear more fruit.

These are all early steps to take for the development of a healthy plant and a good crop.



Planting